WHAT IS CLAIMED IS:

1. A method of enhancing cardiac pacing, the method comprising:

measuring at least one characteristic of a heart using one or more parameter measuring devices disposed in the heart;

calculating at least one cardiac performance parameter using the at least one measured characteristic; and

automatically adjusting at least one functional parameter of a cardiac pacing device.

2. A method as in claim 1, wherein the at least one functional parameter is automatically adjusted based on the at least one calculated cardiac performance parameter.

3. A method as in claim 1, wherein measuring the at least one characteristic comprises measuring with at least one sensor device implanted in at least one wall of the heart.

4. A method as in claim 1, wherein measuring the at least one characteristic comprises measuring with at least one catheter device disposed in at least one chamber of the heart.

5. A method as in claim 4, wherein measuring the at least one characteristic further comprises measuring with at least one sensor device implanted in at least one wall of the heart.

6. A method as in claim 4, wherein the at least one catheter comprises a catheter positioned only in the right side of the heart.

7. A method as in claim 4, wherein the at least one catheter comprises a multiplexed catheter.

8. A method as in claim 7, wherein the at least one multiplexed catheter is disposed at least partially within at least one of a left ventricle and a right ventricle of the heart.

9. A method as in claim 1, wherein measuring the at least one characteristic comprises measuring at least one of pressure, volume, blood flow velocity,

blood oxygen concentration, carbon dioxide concentration, wall stress, wall thickness, force, electric charge, electric current and electric conductivity.

10. A method as in claim 9, wherein each characteristic is measured in at least one of a chamber of the heart, a wall of the heart and a blood vessel adjacent the heart.

11. A method as in claim 9, wherein measuring comprises:

measuring at least one blood oxygen concentration in at least one chamber on the left side of the heart; and

measuring at least one blood oxygen concentration in at least one chamber on the right side of the heart.

12. A method as in claim 11, further comprising:

measuring a systemic vascular resistance; and

automatically adjusting the cardiac pacing device based on at least one of the measured blood oxygen concentrations and on the measured systemic vascular resistance.

13. A method as in claim 1, wherein measuring the at least one characteristic comprises measuring at least one blood oxygen concentration in a patient having a shunt.

14. A method as in claim 13, further comprising positioning at least a portion of a parameter measuring device in at least one of a pulmonary artery, a superior vena cava, an inferior vena cava and a right ventricle, wherein the portion of the parameter measuring device includes means for measuring blood oxygen content.

15. A method as in claim 14, wherein automatically adjusting comprises adjusting the cardiac pacing device based on at least one blood oxygen content measured by the parameter measuring device.

16. A method as in claim 1, wherein calculating the at least one cardiac performance parameter comprises calculating at least one of ejection fraction, cardiac output, cardiac index, stroke volume, stroke volume index, pressure reserve, volume reserve, cardiac reserve, cardiac reserve index, stroke reserve index, myocardial work, myocardial work index, myocardial reserve, myocardial reserve index, stroke work, stroke work index, stroke work reserve, stroke work reserve index, systolic ejection period, stroke power, stroke power

reserve, stroke power reserve index, myocardial power, myocardial power index, myocardial power reserve, myocardial power reserve index, myocardial power requirement, dP/dt, d^2P/dt, ejection contractility, cardiac efficiency, cardiac amplification, valvular gradient, valvular gradient reserve, valvular area, valvular area reserve, valvular regurgitation, valvular regurgitation reserve, a pattern of electrical emission by the heart, concentration of oxygen in the cardiac vein, and a ratio of carbon dioxide to oxygen.

17. A method as in claim 1, wherein the cardiac pacing device comprises one or more pacing leads.

18. A method as in claim 17, wherein at least one of the pacing leads comprises two or more electrodes disposed along its length.

19. A method as in claim 18, wherein the two or more electrodes are multiplexed with the at least one pacing lead.

20. A method as in claim 1, wherein adjusting the at least one functional parameter comprises adjusting at least one of a selected electrode of the cardiac pacing device to be activated, a pulse width of an activation of the cardiac pacing device, a pulse amplitude, a pulse duration, a number of pulses per one cycle of the heart, a pulse polarity, a pulse duty cycle, a timing of pulses relative to a cycle of the heart and a timing of pulses from multiple electrodes of the pacing device relative to one another.

21. A method as in claim 1, wherein adjusting the at least one functional parameter comprises:

assigning a first relative weight to a first calculated cardiac performance parameter;

assigning a second relative weight to a second calculated cardiac performance parameter; and

determining at least one adjustment to be made to the at least one functional parameter, based on the first and second calculated cardiac performance parameters and the first and second relative weights.

22. A method as in claim 21, further comprising:

assigning a third relative weight to a third calculated cardiac performance parameter; and

determining the at least one adjustment, based on the first, second and third calculated cardiac performance parameters and the first, second and third relative weights.

23. A method as in claim 21, further comprising:

determining at least one apparatus performance parameter of the cardiac pacing apparatus;

assigning a third relative weight to the apparatus performance parameter; and

determining the at least one adjustment, based on the first and second calculated cardiac performance parameters, the at least one apparatus performance parameter and the first, second and third relative weights.

24. A method as in claim 23, wherein determining the at least one apparatus performance parameter comprises determining at least one of an energy consumption rate, a maximum current and a maximum voltage of the cardiac pacing apparatus.

25. A method as in claim 1, further comprising accepting at least one command from the user, the command assigning a relative weight to at least one of the cardiac performance parameters, wherein adjusting the at least one functional parameter comprises determining an adjustment to be made to the at least one functional parameter based on the at least one cardiac performance parameter and the assigned relative weight of each cardiac performance parameter.

26. A method as in claim 25, further comprising accepting an additional command from the user, the additional command assigning a relative weight to at least one apparatus performance parameter, wherein adjusting the at least one functional parameter comprises determining the adjustment based on the at least one cardiac performance parameter, the at least one apparatus performance parameter and the assigned relative weights of each.

27. A method as in claim 1, further comprising providing at least one calculated cardiac performance parameter to a user in the form of data.

28. A method as in claim 27, wherein the data is provided as one or more images on a display monitor.

29. A method as in claim 27, further comprising accepting at least one command from the user, the command designating one or more of the calculated cardiac performance parameters to be provided to the user.

30. A method as in claim 27, further comprising:

measuring the at least one characteristic of the heart after the adjustment step;

calculating the at least one cardiac performance parameter using the at least one re-measured characteristic; and

automatically adjusting at least one functional parameter of a cardiac pacing device.

31. A method as in claim 30, wherein the measuring, calculating and adjusting steps are performed multiple times, and wherein the calculated cardiac performance parameter is provided to the user in the form of data for each adjustment of the functional parameter of the pacing device.

32. A method as in claim 31, wherein the data is provided to the user in the form of a three-dimensional graph on a display monitor.

33. A method as in claim 1, wherein automatically adjusting comprises setting the cardiac pacing device to fire with a timing such that it does not fire during each heart cycle.

34. A method as in claim 33, wherein the timing is selected from the group consisting of firing once every two cycles, once every three cycles and once every four cycles.

35. A method as in claim 33, wherein setting the cardiac pacing device further comprises selecting at least one firing pattern from a group of possible firing patterns.

36. A method as in claim 1, wherein automatically adjusting comprises causing the cardiac pacing device to stimulate at least a first chamber of the heart before stimulating at least a second chamber of the heart.

37. A method as in claim 36, wherein the cardiac pacing device stimulates the right atrium before stimulating the right ventricle.

38. A method as in claim 36, wherein the cardiac pacing device stimulates both atria before stimulating both ventricles.

39. A method as in claim 36, wherein the cardiac pacing device stimulates the right ventricle before stimulating the left ventricle.

40. A method as in claim 36, wherein the cardiac pacing device stimulates the right ventricle before stimulating the right atrium.

41. A method as in claim 36, wherein the cardiac pacing device stimulates the left ventricle before stimulating the right ventricle or the right atrium.

42. A method as in claim 36, wherein automatically adjusting further comprises:

comparing at least one left ventricular end diastolic pressure measured by the parameter measuring device with a pre-defined left ventricular end diastolic pressure control range; and

adjusting the cardiac pacing device based on the comparison.

43. A method as in claim 42, further comprising:

measuring at least one right ventricular pressure; and

adjusting the cardiac pacing device based on the comparison and on the measured right ventricular pressure.

44. A method as in claim 1, wherein automatically adjusting comprises causing the cardiac pacing device to stimulate at least a first valve of the heart before stimulating at least a second valve of the heart.

45. A method as in claim 1, wherein measuring comprises:

measuring at least a first pressure using a first lead positioned in at least one of the right atrium and the right ventricle of the heart; and

measuring at least a second pressure using a second lead positioned in the coronary vein over the left ventricle of the heart.

46. A method as in claim 45, further comprising measuring an ambient pressure.

47. A method as in claim 45, wherein calculating comprises estimating a left ventricular pressure from the second pressure.

48. A method as in claim 45, wherein adjusting comprises adjusting timing of firing of the first and second leads.

49. A method as in claim 48, wherein adjusting the firing timing comprises adjusting the timing to minimize left ventricular end diastolic pressure.

50. A method as in claim 48, wherein adjusting the firing timing comprises adjusting the timing to minimize left ventricular end diastolic pressure in response to at least one measured parameter measured by at least one sensor.

51. A method as in claim 48, wherein adjusting the firing timing comprises adjusting the timing to increase left ventricular end diastolic pressure to increase cardiac output.

52. A method as in claim 48, wherein adjusting the firing timing comprises adjusting the timing to increase cardiac output in response to at least one measured parameter measured by at least one sensor.

53. A method of enhancing cardiac pacing, the method comprising:

measuring at least a first pressure using a first sensor positioned in at least one of the right atrium and the right ventricle of a heart;

measuring at least a second pressure using a second sensor positioned in the coronary vein over the left ventricle of the heart;

measuring an ambient pressure for use in calculating a gauge pressure; and

adjusting the cardiac pacing based on the measured first and second gauge pressures.

54. A method of enhancing cardiac pacing, the method comprising:

measuring at least one left ventricular end diastolic pressure;

measuring a proxy for ambient pressure for use in calculating a gauge pressure; and

adjusting the cardiac pacing based on the gauge pressure.

55. Apparatus for enhancing cardiac pacing, the apparatus comprising:

at least one measuring device for measuring at least one characteristic of a heart; and

a processor coupled with the at least one measuring device for calculating at least one cardiac performance parameter based on the at least one measured characteristic, determining at least one adjustment to be made to a cardiac pacing device, and transmitting the at least one adjustment to the cardiac pacing device.

56. Apparatus as in claim 55, wherein the at least one measuring device comprises at least one sensor implantable within at least one wall of the heart.

57. Apparatus as in claim 56, wherein the at least one implantable sensor includes at least one of a pressure sensor, a volume sensor, a dimension sensor, a temperature sensor, a thermal sensor, an oxygen sensor, a carbon dioxide sensor, an electrical conductivity sensor, an electrical potential sensor, a pH sensor, a chemical sensor, a flow rate sensor, an optical sensor, an acoustic sensor, a hematocrit sensor and a viscosity sensor.

58. Apparatus as in claim 55, wherein the at least one measuring device comprises at least one catheter positionable within at least one chamber of the heart.

59. Apparatus as in claim 58, wherein the at least one catheter comprises at least one multiplexed catheter.

60. Apparatus as in claim 59, wherein the at least one multiplexed catheter includes at least one sensor selected from the group consisting of pressure sensors, volume sensors, dimension sensors, temperature sensors, thermal sensors, oxygen sensors, carbon dioxide sensors, electrical conductivity sensors, electrical potential sensors, pH sensors, chemical sensors, flow rate sensors, optical sensors, acoustic sensors, hematocrit sensors and viscosity sensors.

61. Apparatus as in claim 60, wherein the at least one multiplexed catheter further includes at least one actuator, the at least one actuator performing a function selected

from the group consisting of providing an electrical current or voltage, setting an electrical potential, generating a biopotential, pacing a heart, heating a substance or area, inducing a pressure change, releasing or capturing a material, emitting light, emitting sonic or ultrasound energy and emitting radiation.

62. Apparatus as in claim 58, wherein the at least one measuring device further comprises at least one sensor implantable within at least one wall of the heart.

63. Apparatus as in claim 62, wherein the at least one implantable sensor includes at least one of a pressure sensor, a volume sensor, a dimension sensor, a temperature sensor, a thermal sensor, an oxygen sensor, a carbon dioxide sensor, an electrical conductivity sensor, an electrical potential sensor, a pH sensor, a chemical sensor, a flow rate sensor, an optical sensor, an acoustic sensor, a hematocrit sensor and a viscosity sensor.

64. Apparatus as in claim 55, wherein the at least cardiac performance parameter comprises at least one of ejection fraction, cardiac output, cardiac index, stroke volume, stroke volume index, pressure reserve, volume reserve, cardiac reserve, cardiac reserve index, stroke reserve index, myocardial work, myocardial work index, myocardial reserve, myocardial reserve index, stroke work, stroke work index, stroke work reserve, stroke work reserve index, systolic ejection period, stroke power, stroke power reserve, stroke power reserve index, myocardial power, myocardial power index, myocardial power reserve, myocardial power reserve index, myocardial power requirement, dP/dt, d^2P/dt, ejection contractility, cardiac efficiency, cardiac amplification, valvular gradient, valvular gradient reserve, valvular area, valvular area reserve, valvular regurgitation and valvular regurgitation reserve.

65. Apparatus as in claim 64, wherein the processor determines the at least one adjustment by assigning a relative weight to at least one of the cardiac performance parameters and calculating the adjustment based on the cardiac performance parameters and the relative weights assigned to each.

66. Apparatus as in claim 65, wherein the processor receives at least one cardiac pacing device performance parameter from the cardiac pacing device, and wherein the processor further assigns an additional relative weight to at least one of the device performance parameters and calculates the at least one adjustment based on the cardiac

performance parameters, the device performance parameters, and the relative weights assigned to each.

67. Apparatus as in claim 55, wherein the processor is coupled with the cardiac pacing device to allow the processor to automatically adjust one or more functional parameters of the device.

68. Apparatus as in claim 55, wherein the processor transmits the at least one adjustment to the cardiac pacing device via a wireless connection.

69. Apparatus as in claim 55, wherein the processor is couplable with a display device such that the processor transmits at least one of the cardiac performance parameters to the display device for viewing by a user.

70. Apparatus as in claim 69, wherein the processor further transmits at least one cardiac pacing device performance parameters to the display device for viewing by a user.

71. Apparatus as in claim 55, wherein the processor receives one or more commands from the user, the commands selected from the group consisting of a selection of one or more cardiac performance parameters and pacing device performance parameters to be displayed on the device, a selection of one or more cardiac performance parameters and pacing device performance parameters to be used by the processor to calculate the at least one adjustment to the cardiac pacing device, and a selection of a relative importance to be assigned to at least one of the cardiac performance parameters and pacing device performance parameters.

72. Apparatus as in claim 71, wherein the processor calculates the at least one adjustment based at least in part on the one or more commands from the user.

73. Apparatus as in claim 71, further comprising input means for allowing the user to input one or more commands to the processor.

74. Apparatus as in claim 55, further comprising a display device coupled with the processor for displaying at least one of the cardiac performance parameters to a user.

75. Apparatus as in claim 74, further comprising input means coupled with the processor for allowing the user to input one or more commands to the processor.

76. Apparatus as in claim 55, further comprising a cardiac pacing device coupled with the processor for applying electrical stimuli to the heart.

77. Apparatus as in claim 76, wherein the cardiac pacing device comprises one or more pacing leads.

78. Apparatus as in claim 77, wherein at least one of the pacing leads comprises two or more electrodes disposed along its length.

79. Apparatus as in claim 78, wherein the two or more electrodes are multiplexed with the at least one pacing lead.

80. A system for enhancing cardiac pacing, the system comprising:

a cardiac pacing device;

at least one measuring device for measuring at least one characteristic of a heart; and

a processor coupled with the at least one measuring device and the cardiac pacing device, wherein the processor calculates at least one cardiac performance parameter based on the at least one measured characteristic, determines at least one adjustment to be made to the cardiac pacing device, and transmits the at least one adjustment to the cardiac pacing device.

81. A system as in claim 80, wherein the cardiac pacing device comprises one or more pacing leads.

82. A system as in claim 81, wherein at least one of the pacing leads comprises two or more electrodes disposed along its length.

83. A system as in claim 82, wherein the two or more electrodes are multiplexed with the at least one pacing lead.

84. A system as in claim 80, further comprising a display device coupled with the processor for providing data to a user, wherein the processor transmits data

pertaining to at least one of the calculated cardiac performance parameters to the display device.

85. A system as in claim 84, wherein the processor further transmits at least one cardiac pacing device performance parameter to the display device for viewing by a user.

86. A system as in claim 80, wherein the at least one measuring device comprises at least one sensor implantable within at least one wall of the heart.

87. A system as in claim 80, wherein the at least one measuring device comprises at least one catheter positionable within at least one chamber of the heart.

88. A system as in claim 87, wherein the at least one catheter comprises at least one multiplexed catheter.

89. A system as in claim 88, wherein the at least one multiplexed catheter includes at least one sensor selected from the group consisting of pressure sensors, volume sensors, dimension sensors, temperature sensors, thermal sensors, oxygen sensors, carbon dioxide sensors, electrical conductivity sensors, electrical potential sensors, pH sensors, chemical sensors, flow rate sensors, optical sensors, acoustic sensors, hematocrit sensors and viscosity sensors.

90. A system as in claim 89, wherein the at least one multiplexed catheter further includes at least one actuator, the at least one actuator performing a function selected from the group consisting of providing an electrical current or voltage, setting an electrical potential, generating a biopotential, pacing a heart, heating a substance or area, inducing a pressure change, releasing or capturing a material, emitting light, emitting sonic or ultrasound energy and emitting radiation.

91. A system as in claim 87, wherein the at least one measuring device further comprises at least one sensor device implantable in at least one wall of the heart.

92. A system as in claim 91, wherein the at least one implantable sensor includes at least one of a pressure sensor, a volume sensor, a dimension sensor, a temperature sensor, a thermal sensor, an oxygen sensor, a carbon dioxide sensor, an electrical

conductivity sensor, an electrical potential sensor, a pH sensor, a chemical sensor, a flow rate sensor, an optical sensor, an acoustic sensor, a hematocrit sensor and a viscosity sensor.

93. A system as in claim 80, wherein the at least one calculated cardiac performance parameter comprises at least one of ejection fraction, cardiac output, cardiac index, stroke volume, stroke volume index, pressure reserve, volume reserve, cardiac reserve, cardiac reserve index, stroke reserve index, myocardial work, myocardial work index, myocardial reserve, myocardial reserve index, stroke work, stroke work index, stroke work reserve, stroke work reserve index, systolic ejection period, stroke power, stroke power reserve, stroke power reserve index, myocardial power, myocardial power index, myocardial power reserve, myocardial power reserve index, myocardial power requirement, dP/dt, d^2P/dt, ejection contractility, cardiac efficiency, cardiac amplification, valvular gradient, valvular gradient reserve, valvular area, valvular area reserve, valvular regurgitation and valvular regurgitation reserve.

94. A system as in claim 93, wherein the processor determines the at least one adjustment by assigning a relative weight to at least one of the cardiac performance parameters and calculating the adjustment based on the cardiac performance parameters and the relative weights assigned to each.

95. A system as in claim 94, wherein the processor receives at least one cardiac pacing device performance parameter from the cardiac pacing device, and wherein the processor further assigns an additional relative weight to at least one of the device performance parameters and calculates the at least one adjustment based on the cardiac performance parameters, the device performance parameters, and the relative weights assigned to each.

96. A system as in claim 80, wherein the processor is coupled to the cardiac pacing device via a wireless connection.

97. A system as in claim 80, wherein the processor is coupled with a display device, and wherein the processor transmits at least one of the cardiac performance parameters to the display device for viewing by a user.

98. A system as in claim 80, wherein the processor receives one or more commands from the user, the commands selected from the group consisting of a selection of one or more cardiac performance parameters and pacing device performance parameters to be displayed on the device, a selection of one or more cardiac performance parameters and pacing device performance parameters to be used by the processor to calculate the at least one adjustment to the cardiac pacing device, and a selection of a relative importance to be assigned to at least one of the cardiac performance parameters and pacing device performance parameters.

99. A system as in claim 98, wherein the processor calculates the at least one adjustment based at least in part on the one or more commands from the user.

100. A system as in claim 98, further comprising input means coupled with the processor for allowing the user to input one or more commands to the processor.